Gate Valve

ZTS 2500-4500

Equivalent of Class 2500-4500
NPS 10" - 24"
Billet-forged
Pressure Seal Design
Butt weld ends

Type Series Booklet

Legal information/Copyright

Type Series Booklet ZTS 2500-4500

Gate Valves

Gate Valves with Pressure Seal Bonnet to DIN/EN

ZTS 2500-4500

Main applications

- Fossil-fuelled power stations
- Process engineering
- Boiler feed applications
- Boiler recirculation
- Chemical industry
- Petrochemical industry
- Sugar industry
- Paper and cellulose industry
- Nuclear power stations

Fluids handled

- Water
- Steam
- Other non-aggressive fluids such as gas or oil on request.

Operating data

Operating properties

Characteristic	Value
Nominal size	NPS 10" - 24"
Max. permissible pressure	Approx. 600 bar / 8700 psi
Max. permissible temperature	+650 °C / +1202 °F

Selection as per pressure/temperature ratings (⇨ Page 5)

Body materials

Overview of available materials

Material	Material number	Temperature limit
15 NiCuMoNb 5 (equivalent of A182-05a F36)	1.6368	Up to 450 °C / 842 °F
X 10 CrMoVNb 9-1 (equivalent of A182 F91)	1.4903	Up to 650 °C / 1202 °F
X 10 CrWMoVNb 9-2 (equivalent of A182 F92)	1.4901	Up to 650 °C / 1202 °F

Other materials on request.

Design details

- Body made of forged steel
- Pressure seal design
- Non-rotating stem
- Wedge discs
- Bypass
- Yoke head suitable for mounting electric and pneumatic actuators (DIN ISO 5210)
- Seat/disc interface made of wear-resistant and corrosion-proof Stellite
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Groups 1 and 2.
- Design, production and acceptance inspection to AD 2000 (calculation standard EN 12516).
- The valves do not have a potential internal source of ignition and can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 94/9/EC.

Variants

- Intermediate Classes
- Flanged ends
- Drain branch
- Parallel discs (type GTD)
- Pressure relief connections (3-branch system)
- Balancing hole in seat ring
- Hard-faced back seat
- Lantern ring in gland packing
- Disc spring supported threaded bush
- Packing combination for high-temperature applications
- Pressure seal joint ring capped with stainless steel
- Position indicator
- Position switch(es)
- Spur gear
- Bevel gear
- Electric actuators
- Pneumatic actuators
- Actuating bush for remote actuation
- Threaded bush free from non-ferrous metals
- Locking device

- Inspections to technical codes such as TRD/TRB – German Steam Boiler / Pressure Vessel Regulations, AD 2000, API 591, IBR (Form III C) or to customer specification

Product benefits

- Robust body made of billet-forged steel.
  - Very dense, homogenous and fine-grained microstructure. Extremely robust material able to withstand high stresses.
  - Ideal for very high pressures and temperatures.
  - Compared with cast bodies no risk of porosity and shrinkage cavities, excellent weldability.
- Additional features ensure safe sealing to atmosphere:
  - Pressure seal design: The higher the pressure in the gate valve body, the tighter the bonnet joint. Metal-capped pure graphite gasket. Very low risk of leakage, particularly at high pressures and temperatures. Compact design.
  - Graphite gland packing with packing end rings, protected against oxidation by metal caps.
- Reliable, tight shut-off and service-friendly design
  - Wedge holder with flexibly mounted wedge discs. Precise alignment of wedge discs with body; wedge discs are easy to replace.
  - Actuating moments are absorbed by the wedge holder and guide ribs in the body. No additional loads on the wedge discs and the seat/disc interface.
  - Standard DIN/ISO connection flange at the yoke head simplifies actuator mounting. No modifications required. No need to dismantle pressure-retaining components.
- Additional safety and blow-out protection by standard back seat.
- Long service life and high functional reliability
  - Stop nut as standard. Limited wedge action prevents jamming in closed position and ensures reliable opening of the valve even in the event of temperature transients.
  - Of the gland packing due to non-rotating stem with burnished shank.
  - Threaded bush runs in ball bearings for smooth actuation.
  - Hard-faced seat/disc interface made of wear-resistant and corrosion-proof Stellite.

Related documents

- Body pressure relief valve see type series booklet 7300.1
- Operating manual 0570.81

On all enquiries/orders please specify

1. Type
2. Nominal size
3. Pressure rating
4. Differential pressure
5. Temperature rating
6. Material
7. Fluid handled
8. Flow rate
9. Pipe connection
10. Variants
11. Number of type series booklet
12. Pressure relief
13. Installation position
14. Actuation method

Always indicate the original serial number and the year of construction when ordering spare parts.

Pressure/temperature ratings (manufacturer's standard)

Permissible operating pressures in **bar** at temperatures in **°C**[1)2)]
Subseries C and D

Material	Subseries	20	100	150	200	250	300	350	400	425	450	475	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640	650
15NiCuMoNb5 1.6368	C	429	407	394	380	367	356	341	327	314	242																	
	CS	445	445	445	445	445	430	415	400																			
	D	660	618	598	578	558	539	518	498	476	374																	
X10CrMoVNb9-1 1.4903	C	268													245	225	204	185	166	148	131	116	102	89	78	67	59	50
	D	408													324	296	270	244	214	195	174	154	135	117	103	87	77	67
X10CrWMoVNb9-2 1.4901	C	268																			134	120	107	94	82	71	61	53
	D	408																			201	180	160	142	123	106	92	79

Permissible operating pressures in **psi** at temperatures in **°F**[1)2)]
Subseries C and D

Material	Subseries	68	212	302	392	482	572	662	752	797	842	887	932	950	968	986	1004	1022	1040	1058	1076	1094	1112	1130	1148	1166	1184	1202
15NiCuMoNb5 1.6368	C	6222	5903	5714	5511	5323	5163	4946	4743	4554	3510																	
	CS	6454	6454	6454	6454	6454	6237	6019	5802																			
	D	9572	8963	8673	8383	8093	7818	7513	7223	6904	5424																	
X10CrMoVNb9-1 1.4903	C	3887													3553	3263	2959	2683	2408	2147	1900	1682	1479	1291	1131	972	856	725
	D	5918													4699	4293	3916	3539	3104	2828	2524	2234	1958	1697	1494	1262	1117	972
X10CrWMoVNb9-2 1.4901	C	3887																			1944	1740	1552	1363	1189	1030	885	769
	D	5918																			2915	2611	2321	2060	1784	1537	1334	1146

1) The valves are suitable for temperatures down to -10 °C or 14 °F.
2) The test pressure is defined in accordance with the provisions of the technical codes PED 97/23/EC; DIN EN 12516-2 and EN 12266-1.

Pressure/temperature ratings to ASME B16.34.

Table for determining the Intermediate Class or ANSI Class

The valves are rated for a specific operating point (pressure/ temperature).

Dimensions and weights subject to modification

Permissible operating pressures in bar at temperatures in °C[1)]
Material 15NiCuMoNb5 (1.6368)
Equivalent Standard Class to ASME B16.34 for A106 Gr. C

Temperature	#2500	#3100	#3600	#4100	#4500
300	357,1	442,8	514,1	585,5	642,6
325	344,3	426,9	495,7	564,5	619,6
350	333,5	413,5	480,2	546,9	600,3
375	315,3	391,0	454,0	517,1	567,5
400	289,3	358,8	416,6	474,5	520,8
425	239,7	297,2	345,2	393,1	431,5
450	191,7	237,7	276,1	314,4	345,1

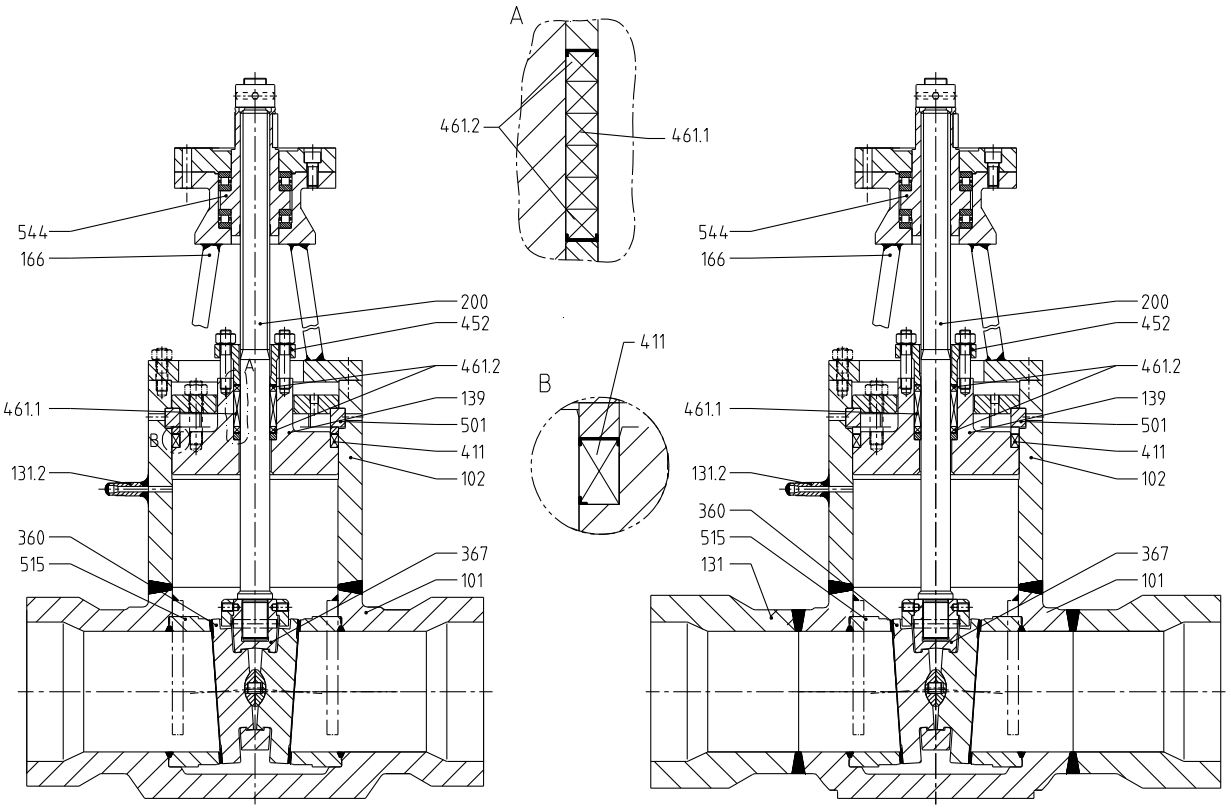
Permissible operating pressures in bar at temperatures in °C[1)]
Material X10CrMoVNb9-1 (1.4903)
Equivalent Standard Class to ASME B16.34 for A182 F91

Temperature	#2500	#3100	#3600	#4100	#4500
500	235,0	291,4	338,4	385,4	423,0
538	208,9	259,0	300,7	342,4	375,8
550	208,0	257,9	299,4	341,0	374,2
575	199,5	247,4	287,3	327,2	359,1
600	162,5	201,5	234,0	266,5	292,5
625	121,7	150,9	175,3	199,6	219,1
650	82,7	102,6	119,1	135,7	148,9

Permissible operating pressures in bar at temperatures in °C[1)]
Material X10CrWMoVNb9-2 (1.4901)
Equivalent Standard Class to ASME B16.34 for A182 F92

Temperature	#2500	#3100	#3600	#4100	#4500
500	235,0	291,4	338,4	385,4	423,0
538	208,9	259,0	300,7	342,4	375,8
550	208,0	257,9	299,4	341,0	374,2
575	199,5	247,4	287,3	327,2	359,1
600	178,5	221,4	257,1	292,8	321,4
625	152,0	188,5	219,0	249,4	273,8
650	110,3	136,8	158,9	180,9	198,6

Materials



Two-piece design; without connection branch extensions

Four-piece design with connection branch extensions (welded on, made of pipeline material)

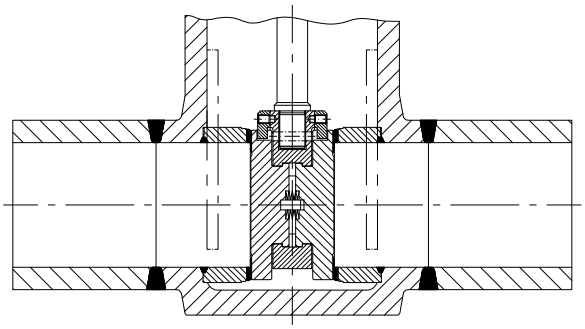
Overview of available materials

Part No.	Description	Materials for operating temperatures up to [°C]	
		Up to 450	Up to 650
101	Lower body section	15NiCuMoNb5 1.6368 (equivalent of A182-05a F36)	X10CrMoVNb 9-1 1.4903 (equivalent of A182 F91) X10CrWMoVNb 9-2 1.4901 (equivalent of A182 F92)
102	Upper body section		
131.1	Connection branch	A105	A182 F91 / A182 F92
		A106 Gr. C	A182 F22
		A182 F12	
139	Bonnet	15NiCuMoNb5 1.6368	X10CrMoVNb 9-1 1.4903 X10CrWMoVNb 9-2 1.4901
501[3)]	Segmental ring		
360[3)]	Wedge discs hard-faced with Stellite 6		
368[3)]	Parallel discs hard-faced with Stellite 6		
515	Seat ring hard-faced with Stellite 6		
131.2	Connection branch	13 CrMo 4-5 1.7335	X10CrMoVNb 9-1 1.4903
166	Yoke	13 CrMo 4-5 1.7335	X10CrMoVNb 9-1 1.4903 X10CrWMoVNb 9-2 1.4901
200[3)]	Stem	X39CrMo17-1 1.4122 X22CrMoV11-1 1.4923	X22CrMoV11-1 1.4923 X5NiCrTi2615 1.4980
367[3)]	Disc/wedge holder	15NiCuMoNb5 1.6368	X10CrMoVNb 9-1 1.4903

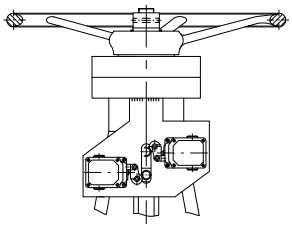
3) Recommended spare parts

Part No.	Description	Materials for operating temperatures up to [°C]	
		Up to 450	Up to 650
411.1[3)]	Joint ring	Pure graphite, capped with stainless steel	
452	Gland follower	13 CrMo 4-5 1.7335	10 CrMo 9-10 1.7380/ 11 CrMo 9-10 1.7383
461[3)]	Gland packing	Pure graphite/stainless steel capped packing end rings	
544[3)]	Threaded bush	Copper base alloys	
961	Handwheel	Steel	

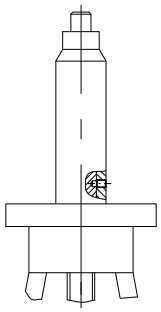
Variants



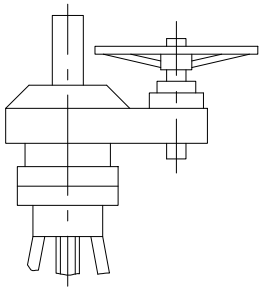
Parallel discs
(type GTD)



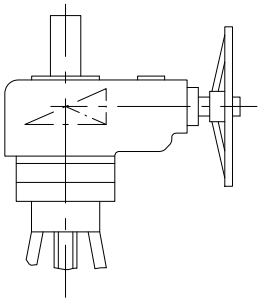
Position indicator with
position switch



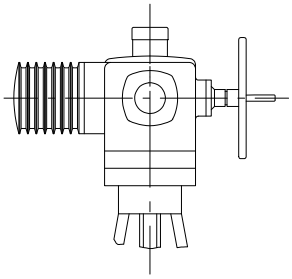
Actuating bush



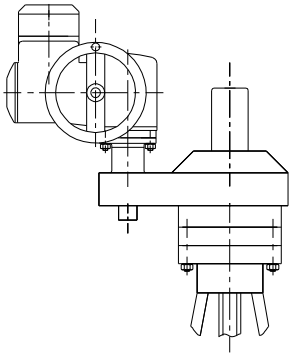
Spur gear with
handwheel



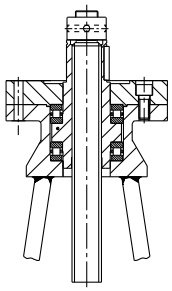
Bevel gear with
handwheel



Electric actuator



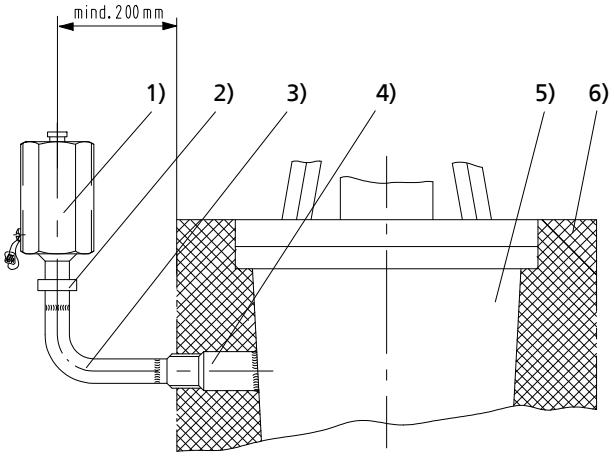
Electric actuator with spur
gear



Double-threaded stem

Body pressure relief valve

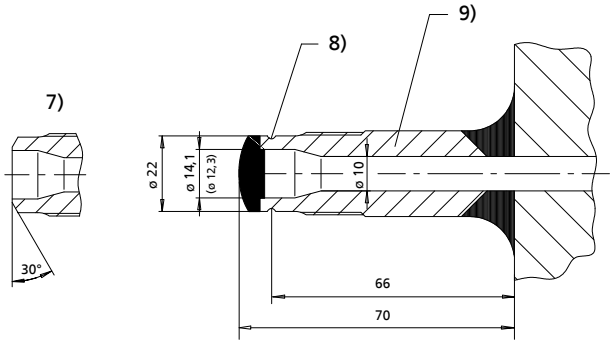
Also refer to type series booklet 7300.1.



1)	Body pressure relief valve for both flow directions	2)	Pipe union (731)
3)	Pipe (710), not included in KSB's scope of supply	4)	Connection branch (131.2)
5)	Body (100)	6)	Insulation

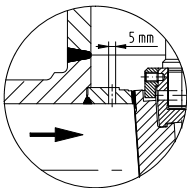
A body pressure relief valve is necessary if, with the gate valve closed, there is a danger of the liquid trapped inside the valve body heating up and causing an unacceptable pressure increase inside the valve. A warning sign is affixed to the yoke arm near the name plate.

All gate valves with pressure seal bonnet are factory-supplied with a closed connection branch (131.2) with connection dimensions ø22/ø14.1 (suitable for pipe ø21.3x3.6).

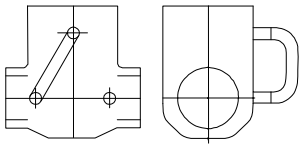


7)	Welding groove	8)	When connecting to pipe (710), cut here and bevel the face to obtain a welding groove.
9)	Connection branch (131.2)		

When ordering please state whether a pressure relief valve is to be provided, or whether excess pressure is to be released via a bypass or a balancing hole in the inlet-side seat ring (515). In those cases, the gate valves can be used for one flow direction only.



Balancing hole in inlet-side seat ring

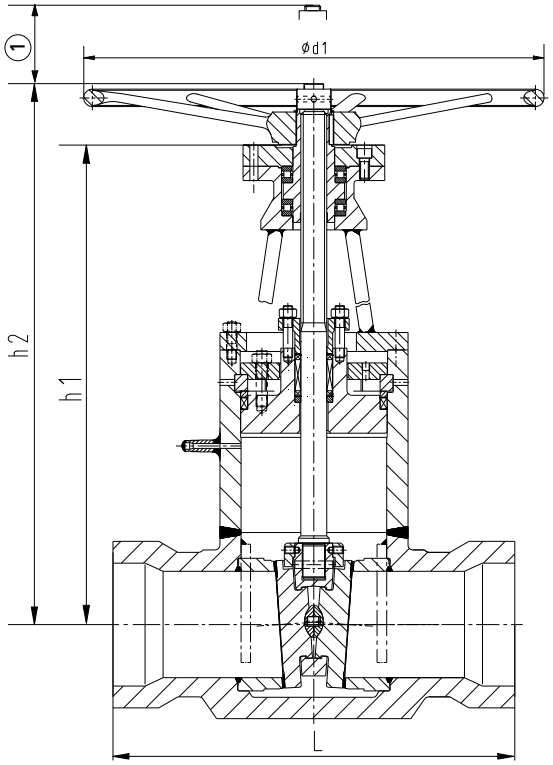


To be connected on site, depending on flow direction

The pressure relief valve must not be welded directly to the connection branch (131.2) but must be connected to it via an intermediate pipe (710) in a vertical, upright position outside the insulating material. The minimum distance to the insulation is 200 mm.

Dimensions

ZTS 2500-4500, two-piece design



①	Travel

Dimensions in mm

		L (manufacturer's standard)		L (ASME B16.10)		h_1		h_2		d_1		Travel		[kg]	
Subseries		C/CS	D	Short pattern[4]	Long pattern	C/CS	D	C/CS	D	C/CS	D	C/CS	D	C/CS	D
NPS[5]	10"	750	950	914	1270	810	1030	925	1175	630	1000	176	184	420	670
	12"	800	950	1041	1422	910	1065	1025	1210	800	1000	196	207	740	1260
	14"	850	1000	1118	-	1055	1130	1200	1275	1000	1000	230	230	770	1360
	16"	950	1150	1245	-	1273	1420	1418	1570	1000	1000	275	290	820	1560
	18"	1200	1550	1397	-	1350	1525	1515	1740	1000	[6]	295	310	1350	2340
	20"	1200	1550	-	-	1485	1670	1650	1835	[6]	[6]	330	350	1890	3450
	22"	1350	1750	-	-	1485	1670	1650	1835	[6]	[6]	330	350	2040	3900
	24"	1350	1750	-	-	1720	1785	1930	2035	[6]	[6]	400	402	2900	5500

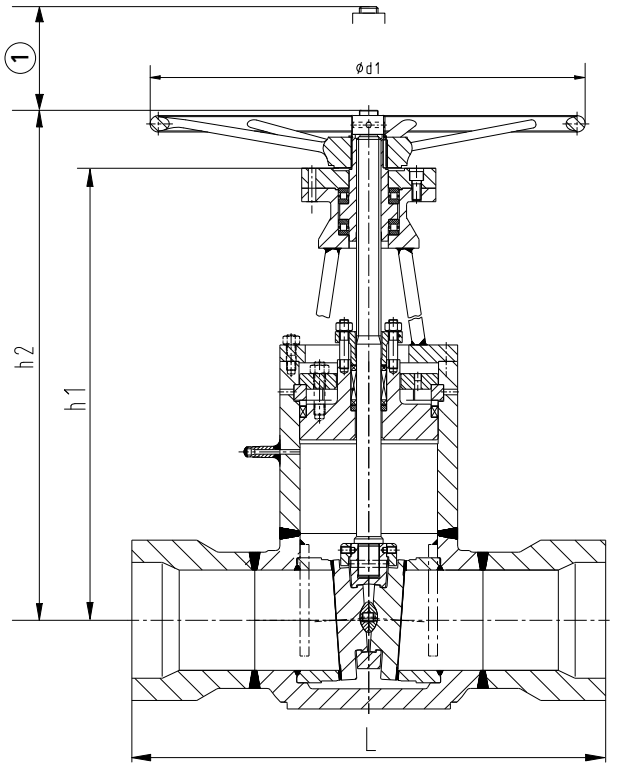
Mating dimensions - Standards

Dimensions of butt weld ends and weld groove form to customer's specification, but only within dimensions $A_{max.}$ und $B_{min.}$

Special dimensions on request.

4) Maximum Class 2500 or Subseries C/CS
5) Other nominal sizes on request.
6) Transmission gearing required

ZTS 2500-4500, four-piece design



①	Travel

Dimensions in mm

		L (manufacturer's standard)		L (ASME B16.10)	h_1		h_2		d_1		Travel		[kg]	
Subseries		C/CS	D	Long pattern	C/CS	D	C/CS	D	C/CS	D	C/CS	D	C/CS	D
NPS[7]	10"	750	950	1270	810	1030	925	1175	630	1000	176	184	420	670
	12"	900	1150	1422	910	1065	1025	1210	800	1000	196	207	740	1260
	14"	950	1200	-	1055	1130	1200	1275	1000	1000	230	230	770	1360
	16"	1050	1350	-	1273	1420	1418	1570	1000	1000	275	290	820	1560
	18"	1200	1550	-	1350	1525	1515	1740	1000	[8]	295	310	1350	2340
	20"	1400	1750	-	1485	1670	1650	1835	[8]	[8]	330	350	1950	3600
	22"	1400	1750	-	1485	1670	1650	1835	[8]	[8]	330	350	2150	4250
	24"	1500	1950	-	1720	1785	1930	2035	[8]	[8]	400	402	3250	6250

Mating dimensions - Standards

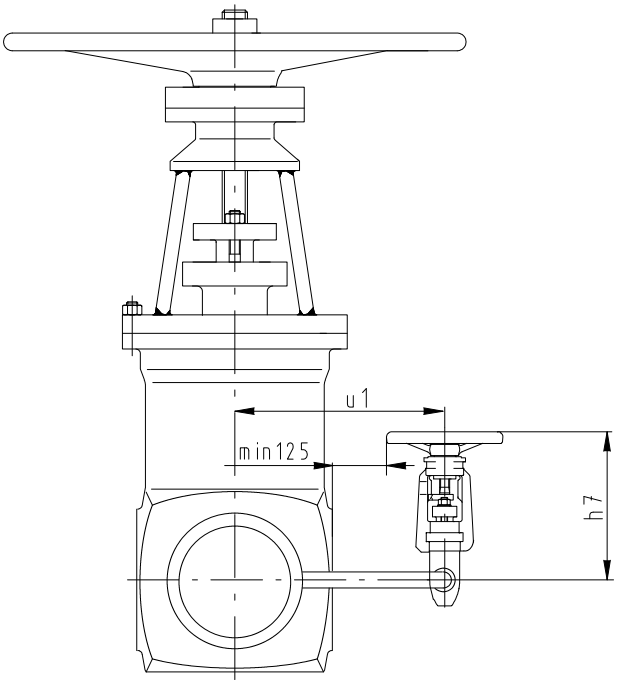
Dimensions of butt weld ends and weld groove form to customer's specification, but only within dimensions $A_{max.}$ und $B_{min.}$

Special dimensions on request.

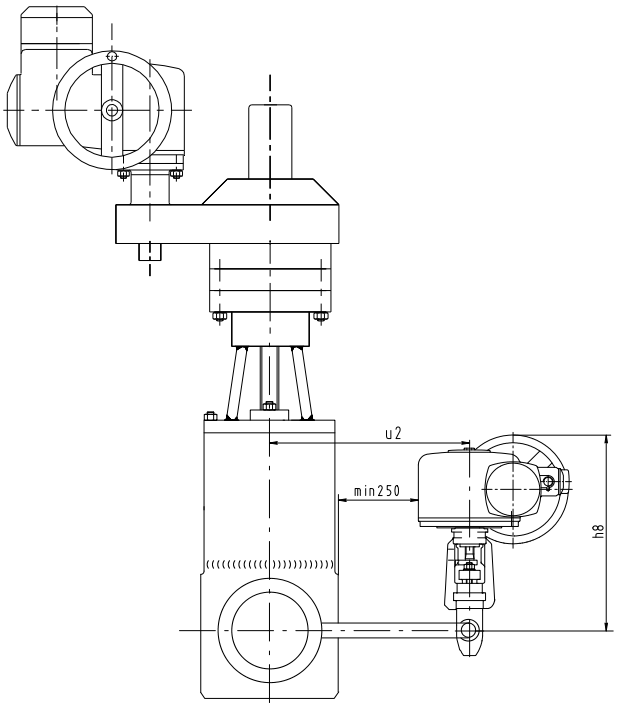
7) Other nominal sizes on request.
8) Transmission gearing required

Bypass

A bypass is provided as a standard. It serves to reduce surge pressures when the gate valve is opened and enables the use of smaller actuators. A NORI 500 globe valve as per type series booklet 7641.1 is used as bypass valve.



Model with handwheel and bypass with handwheel



Model with spur gear and bypass with actuator

Bypass dimensions for subseries C and D

Dimensions in mm

NPS	Max. overhang		Height	
	u_1	u_2	h_7	h_8
10"	455	565	255	570
12"/14"	500	695	255	570
16"	560	755	255	570
18"	600	830	255	570
20"/22"	600	830	255	570
24"	600	830	255	570

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7452.1/03-EN

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